



## IHY-AFRICA/SCINDA 2009

7 – 12 June 2009

Livingstone, Zambia

## Workshop Report



**IHY-Africa/SCINDA 2009**

# REPORT DOCUMENTATION PAGE

*Form Approved  
OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.  
**PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

<b>1. REPORT DATE (DD-MM-YYYY)</b> 04/29/2010		<b>2. REPORT TYPE</b> Technical		<b>3. DATES COVERED (From - To)</b> 06/15/2007-06/12/2009	
<b>4. TITLE AND SUBTITLE</b> 2 <sup>nd</sup> International Heliophysical Year- SCIDA Workshop				<b>5a. CONTRACT NUMBER</b> FA9550-07-1-0488	<b>5b. GRANT NUMBER</b>
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b> Abebe Kebede				<b>5d. PROJECT NUMBER</b>	<b>5e. TASK NUMBER</b>
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> North Carolina Agricultural and Technical State University  1601 East Market St. Greensboro NC 27411				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>  210080	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>  US Air Force				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>
<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b> Unlimited					
<b>13. SUPPLEMENTARY NOTES</b> Three workshops were conducted. 2006 in Cape Verde funded by EAORD, 2007 Ethiopia and 2009 in Zambia. The last two were sponsored by several organization including US-Air Force					
<b>14. ABSTRACT</b> NC A&T State University, in collaboration with US Air Force Research Laboratory Addis Ababa University and Bahir Dar University and the Instituto Nacional De Meteorologica E. Geofisica will organize the 2nd International SCINDA Workshop in Addis Ababa Ethiopia, during the period of November 11- 16, 2007. The workshop is sponsored by a grant obtained from the European Office for Aerospace Research and Development (EOARD) and United States Air Force. Scientists from Ethiopia, Nigeria, Ivory Coast, Cameroon, Cape Verde, Kenya, Mozambique, South Africa and USA will participate in the workshop. The overall goals of the workshop are to establish space science expertise and develop a network of space weather observations across Africa.					
<b>15. SUBJECT TERMS</b>					
<b>16. SECURITY CLASSIFICATION OF:</b>		<b>17. LIMITATION OF ABSTRACT</b>	<b>18. NUMBER OF PAGES</b>	<b>19a. NAME OF RESPONSIBLE PERSON</b> Abebe Kebede	
a. REPORT	b. ABSTRACT	c. THIS PAGE		<b>19b. TELEPHONE NUMBER (include area code)</b> 336 285 2113	

**June 7<sup>th</sup> to June 12<sup>th</sup> 2009  
Livingstone, Zambia**

**Hosted by:**  
**University of Zambia, Zambia**  
*in collaboration with*  
**Hermanus Magnetic Observatory, South Africa**  
**North-West University, South Africa**  
**Air Force Research Laboratory, USA**

**Sponsors:**

National Aeronautics and Space Administration (NASA), Greenbelt, Maryland, USA

Air Force Research Laboratory (AFRL), Hanscom Air Force Base, Massachusetts,  
USA

The National Research Foundation (NRF), Pretoria, South Africa

European Office of Aerospace Research and Development (EOARD), London, UK

National Science Foundation (NSF), Arlington, Virginia, USA

International Center for Theoretical Physics (ICTP), Trieste, Italy

Climate and Weather of the Sun-Earth System (CAWSES)/International Committee  
on Solar-Terrestrial Physics (SCOSTEP)

International Union of Radio Science (URSI) Commission G and H, Belgium

University of Colorado, Cooperative Institute for Research in Environmental Sciences  
(CIRES), Boulder, Colorado, USA

MTN Mobile Solutions, Pretoria, South Africa

North-West University (NWU), Potchefstroom, South Africa

Hermanus Magnetic Observatory (HMO), Hermanus, South Africa

Rhodes University, Grahamstown, South Africa

University of Zambia (UNZ), Lusaka, Zambia

The National Science and Technology Council (NSTC),, Lusaka, Zambia

North Carolina A&T State University, North Carolina, USA

## **Introduction**

As a continuation of the very successful International Heliophysical Year (IHY)-Africa 2007 workshop, which was held in Addis Ababa, Ethiopia in November 2007, the IHY-Africa 2009 workshop was organized in Livingstone, Zambia during the period 7 – 12 June 2009. The purpose of the workshop was to facilitate scientific interaction between space science instrument donors and host institutes and promote space science in Africa, with a strong focus on education and public outreach. Additional aims of the workshop were to converge African and other international scientists under one roof, facilitate the deployment of new observational infrastructure to study space weather, spark interest in space science education and research, and encourage the next generation of African scientists to become interested in the space sciences. The workshop was also the ideal forum to review and document the ongoing instrument deployment and data retrieval progress during the IHY period. This workshop also marked the end of the IHY period and the beginning of the International Space Weather Initiative (ISWI) which will take over the IHY work.

The workshop was aimed at scientists and students from African countries, and those international scientists interested in working together with African scientists, who are involved in all aspects of Space Physics, and included four main science sessions, two major poster sessions and four discussion forums.

The workshop was held in conjunction with the Scintillation Network Decision Aid (SCINDA) 2009 meeting and sessions of particular interest to SCINDA were held on the first two days of the meeting.

## **Attendees and Logistics**

The workshop was organized through three committees, the International Advisory Committee, the International Organising and Programme Committee, and the Local Organising Committee (LOC). A list of the members of these committees appears in Appendix A.

A total of 116 delegates attended the workshop in Zambia. Of these delegates, 79 represented 19 different African countries and 37 travelled from 8 different countries outside of Africa. The list of countries represented at the workshop is given in Appendix B, and a complete list of delegates can be found in Appendix C. What is worth mentioning here is that 24 of the delegates were postgraduate students and 10 were undergraduate students from the University of Zambia.

Due to the generous sponsorship that the workshop received, 74 African delegates and 13 rest of world delegates were sponsored either partially or in full. Travel arrangements were made for the selected sponsored African scientists using a travel agency in South Africa who made all the flight arrangements for the sponsored delegates. The same travel agency also assisted when changes were needed to flights during the workshop. The travel arrangements for the sponsored US scientists were made in the US through UCLA, and were coordinated by Dr Endawoke Yizengaw. Travel arrangements for the Zambian based participants were coordinated by UNZA staff.

The workshop was held in the New Fairmount Hotel (NFH) in Livingstone. Of the 116 delegates, 110 were accommodated in the NFH with 6 choosing to make their own arrangements. The LOC coordinated all the accommodation arrangements with the NFH, who also arranged all the meals and tea breaks.

The opening ceremony was held on the afternoon of Monday 8 June 2009, and included presentations in the conference hall followed by a sunset cruise on the Zambezi River. The opening ceremony was chaired by Prof Roger Smith, Director of Geophysical Institute of University of Alaska and was attended by the Dean of the School of Natural Sciences of the University of Zambia, Dr Samuel Banda, the Vice Chancellor of the University of Zambia, Prof Stephen Simukanga, and the Honourable

Zambian Minister of Science and Technology, Honourable Gabriel Namulambe. Presentations were made by Dr Joseph Davila, the International Heliophysical Year Secretariat as well as a few representatives from the sponsors. The three Zambian guests of honour also made presentations which were motivating for science in Zambia and illustrated the Zambian government's commitment to science and technology and their appreciation for the presence of the IHY-Africa/SCINDA 2009 workshop in Livingstone.

## Scientific Programme

The first one and a half days (Sunday and Monday morning) were dedicated to the SCINDA workshop presentations. Monday afternoon was dedicated to the opening ceremony. The scientific programme of the workshop included four main Heliophysics science sessions, as follows with convener names:

- Total Electron Content - Tim Fuller-Rowell and Christine Amory-Mauzaudier
- Irregularities and scintillations – Lee-Anne McKinnell and Keith Groves
- Sun-Heliosphere connection – Marius Potgieter
- Magnetosphere-Ionosphere coupling - Endawoke Yizengaw and Vafi Doumouya

These four science sessions included 40 invited oral presentations with the main focus on space science over the African region.

In addition there were 2 poster sessions which were convened by Pierre Cilliers and chaired by postgraduate students. A total of 46 posters were presented with 23 in each session. The two poster sessions were divided according to the same main science sessions mentioned above with the one exception that a poster session with a general theme was included so that poster abstracts that did not fit into one of the main sessions could also be included.

Included in the program were four one hour open discussion forums, as follows with convener names:

- Infrastructure and Communications in Africa – Victor Chukwuma and Daniel Moeketsi
- Science Education and Outreach – Carolyn Sumners and Patricia Reiff
- Instruments and Databases – Christine Amory-Mazaudier and Justin Mabie
- Establishment of African Geophysical Society – Babatunde Rabiu and Baylie Damtie.

The full workshop programme appears in Appendix D.

## Outreach

The IHY-Africa/SCINDA 2009 workshop had a large outreach and public awareness component. On the Saturday prior to the workshop a NASA Geophysical Information for Teachers (GIFT) workshop was held at the New Fairmount Hotel in Livingstone, Zambia. The workshop was entitled "Sun-Earth Relationships and the International Heliophysical Year" and was attended by 22 local school teachers. Several teaching aid materials were given to those teachers who participated in the GIFT workshop and these will help them in their teaching and learning processes within their classroom. The workshop program and organizing committees are listed in Appendix E.

In addition one of the local high schools, Hillcrest National Technical High School, brought approximately 30 learners to each poster session evening. These learners were introduced to the international scientists who spent time with them, and they had access to a portable planetarium which was installed in the venue throughout the week especially for the workshop. The planetarium, from Rice University, was brought by the GIFT workshop organizers for a GIFT workshop demonstration. At the end of the

workshop the planetarium was donated to the University of Zambia, which makes Zambia the second country, next to Ethiopia, in Africa that has a portable scientific planetarium dome. Several of the scientists and students attending the workshop also visited Hillcrest during the week to give presentations and talk to the learners.

## Conclusion

The workshop was successful in meeting the aim of bringing together African Space Scientists and providing a forum in which they could meet and make contacts with international colleagues in the field (Figures 1 and 2 below are examples). A number of collaborations have been established as a result of the workshop, and a number of students were exposed to the Space Science field and to successful African scientists in the field. The problems of database access and infrastructure requirements were also discussed, and scientists with instrumentation had access to expertise with whom they could discuss problems. Meetings like these form a very valuable part of scientific research and should be encouraged and supported.

This workshop would not have been possible without the support of the sponsors who are listed at the front of this report, and would not have been successful without the support and hard work of the Zambian and South African organizing team.



Figure 1: Prof Nat Gopalswamy (left) from NASA in the USA in discussions with Jean Uwamahoro, a young Rwandan student.



Figure 2: Mpho Tshisaphungo, a South African student, and Daniel Okoh, a Nigerian student, with Prof Sandro Radicello (center) from ICTP in Italy.

# APPENDIX A

## ADVISORY COMMITTEES

### **International Advisory Committee**

Tim Fuller-Rowell ([Tim.Fuller-Rowell@noaa.gov](mailto:Tim.Fuller-Rowell@noaa.gov))  
Sunanda Basu ([sbasu@bu.edu](mailto:sbasu@bu.edu))  
Christine Mazaudier (christine.amory@lpp.polytechnique.fr)  
Monique Petitdidier ([monique.petitdidier@cetp.ipsl.fr](mailto:monique.petitdidier@cetp.ipsl.fr))  
Endawoke Yizengaw ([ekassie@igpp.ucla.edu](mailto:ekassie@igpp.ucla.edu))  
Patricia Doherty ([dohertpd@bc.edu](mailto:dohertpd@bc.edu))  
Keith Groves ([Keith.Groves@hanscom.af.mil](mailto:Keith.Groves@hanscom.af.mil))

### **International Organising and Programme Committee**

Marius Potgieter ([marius.potgieter@nwu.ac.za](mailto:marius.potgieter@nwu.ac.za))  
Lee-Anne McKinnell ([L.McKinnell@ru.ac.za](mailto:L.McKinnell@ru.ac.za))  
Keith Groves ([Keith.Groves@hanscom.af.mil](mailto:Keith.Groves@hanscom.af.mil))  
Joseph M. Davila ([Joseph.M.Davila@nasa.gov](mailto:Joseph.M.Davila@nasa.gov))  
Endawoke Yizengaw ([ekassie@igpp.ucla.edu](mailto:ekassie@igpp.ucla.edu))  
Nat Gopalswamy ([gopals@ssedmail.gsfc.nasa.gov](mailto:gopals@ssedmail.gsfc.nasa.gov))  
Barbara Thompson ([barbara.j.thompson@nasa.gov](mailto:barbara.j.thompson@nasa.gov))  
Nchimunya Mwiinga ([nchimy@gmail.com](mailto:nchimy@gmail.com))  
Tim Fuller-Rowell ([Tim.Fuller-Rowell@noaa.gov](mailto:Tim.Fuller-Rowell@noaa.gov))  
Karen Fay O'Loughlin ([Karen.O'Loughlin@noaa.gov](mailto:Karen.O'Loughlin@noaa.gov))  
David Anderson (David.Anderson@noaa.gov)  
Eduardo Araujo-Pradere ([Eduardo.Araujo@noaa.gov](mailto:Eduardo.Araujo@noaa.gov))  
Patricia Doherty ([dohertpd@bc.edu](mailto:dohertpd@bc.edu))  
Pierre Cilliers ([pjcilliers@hmo.ac.za](mailto:pjcilliers@hmo.ac.za))  
Stefan Lotz ([slotz@hmo.ac.za](mailto:slotz@hmo.ac.za))

### **Local Organising Committee**

Marius Potgieter ([marius.potgieter@nwu.ac.za](mailto:marius.potgieter@nwu.ac.za))  
Lee-Anne McKinnell ([L.McKinnell@ru.ac.za](mailto:L.McKinnell@ru.ac.za))  
Nchimunya Mwiinga ([nchimy@gmail.com](mailto:nchimy@gmail.com))  
Patrick Sibanda ([psibanda@hmo.ac.za](mailto:psibanda@hmo.ac.za))  
John Bosco Habarulema ([jhabarulema@hmo.ac.za](mailto:jhabarulema@hmo.ac.za))  
Chigomezyo Ngwira ([cngwira@hmo.ac.za](mailto:cngwira@hmo.ac.za))  
Stefan Lotz ([slotz@hmo.ac.za](mailto:slotz@hmo.ac.za))  
Petro Sieberhagen ([petro.sieberhagen@nwu.ac.za](mailto:petro.sieberhagen@nwu.ac.za))  
Peter Kalebwe ([pckalebwe2000@yahoo.com](mailto:pckalebwe2000@yahoo.com))

## **APPENDIX B**

### **Countries Represented at the IHY-Africa/SCINDA 2009 Workshop**

Algeria  
Botswana  
Burkina Faso  
Congo DR  
Czech Republic  
Egypt  
Ethiopia  
France  
Germany  
Ghana  
Italy  
Ivory Coast  
Japan  
Kenya  
Liberia  
Malawi  
Mozambique  
Niger  
Nigeria  
Portugal  
Rwanda  
South Africa  
Uganda  
UK  
USA  
Zambia  
Zimbabwe

## APPENDIX C

### IHY-Africa/SCINDA 2009 PARTICIPANTS

Adeniyi, Jacob; University of Ilorin, Ilorin, Nigeria	<a href="mailto:segun47@yahoo.com">segun47@yahoo.com</a>
Adewale, Adekola; University of Lagos, Lagos, Nigeria	<a href="mailto:olajide3000@yahoo.com">olajide3000@yahoo.com</a>
Amable, Grace Nunya; University of Cape Coast, Ghana	<a href="mailto:n1ab2002@yahoo.com">n1ab2002@yahoo.com</a>
Amaeshi, Larry L. N.; University of Lagos, Akoka, Yaba, Lagos, Nigeria	<a href="mailto:larryamma@yahoo.co.uk">larryamma@yahoo.co.uk</a>
Amory-Mazaudier, Christine; Laboratoire de Physique des Plasmas, CNRS, UPMC, Saint-Maur-des-Fossés, France	<a href="mailto:christine.amory@lpp.polytechnique.fr">christine.amory@lpp.polytechnique.fr</a>
Anad, Fatma; Centre de Recherche en Astronomie Astrophysique et Géophysique (C.R.A.A.G.), Algiers, Algérie	<a href="mailto:f.anad@craag.dz">f.anad@craag.dz</a>
Bailey, Scott; Virginia Tech, Blacksburg, Virginia, USA	<a href="mailto:baileys@vt.edu">baileys@vt.edu</a>
Baki Olande, Paul; University of Nairobi, Nairobi, Kenya	<a href="mailto:pbaki@uonbi.ac.ke">pbaki@uonbi.ac.ke</a>
Beedoe, Shelton Y.; University of Liberia, Monrovia, Liberia	<a href="mailto:sheltonbeedoe@juno.com">sheltonbeedoe@juno.com</a>
Béniguel, Yannick; IEEA	<a href="mailto:beniguel@ieea.fr">beniguel@ieea.fr</a>
Bilitza, Dieter; George Mason University, Fairfax, Virginia, USA	<a href="mailto:dbilitza@gmu.edu">dbilitza@gmu.edu</a>
Browne, Nana A. K.; University of Cape Coast, Ghana	<a href="mailto:nbrownne@csag.uct.ac.za">nbrownne@csag.uct.ac.za</a>
Burešová, Dalia; Institute of Atmospheric Physics, ASCR, Prague, Czech Republic	<a href="mailto:buresd@ufa.cas.cz">buresd@ufa.cas.cz</a>
Carlson, Herbert; European Office of Aerospace Research and Development (EOARD), London, UK	<a href="mailto:herb.carlson@london.af.mil">herb.carlson@london.af.mil</a>
Carrano, Charles; Institute for Scientific Research, Boston College, Chestnut Hill, Massachusetts, USA	<a href="mailto:charles.carrano@bc.edu">charles.carrano@bc.edu</a>

Caton, Ronald; Space Weather Center of Excellence, Air Force Research Laboratory (AFRL), Space Vehicles Directorate, Hanscom Air Force Base, Massachusetts, USA	<a href="mailto:ronald.caton@hanscom.af.mil"><u>ronald.caton@hanscom.af.mil</u></a>
Chibueze, James; University of Nigeria, Nsukka, Nigeria	<a href="mailto:james.chibueze@gmail.com"><u>james.chibueze@gmail.com</u></a>
Chimidza, Oyapo; Botswana College of Agriculture, Gaborone, Botswana	<a href="mailto:oyapo@yahoo.com"><u>oyapo@yahoo.com</u></a>
Chukwuma, Victor; Olabisi Onabanjo University, Ago-Iwoye, Nigeria	<a href="mailto:victorchukwuma@yahoo.com"><u>victorchukwuma@yahoo.com</u></a>
Cilliers, Pierre; Hermanus Magnetic Observatory, Hermanus, South Africa	pjcilliers@hmo.ac.za
Collier, Andrew; Hermanus Magnetic Observatory, Hermanus, South Africa	collierab@gmail.com
Coster, Anthea; Massachusetts Institute of Technology (MIT) Haystack Observatory, Massachusetts, USA	ajc@haystack.mit.edu
Cottrell, Roger; Stanford Linear Accelerator Center, National Accelerator Lab, Stanford University, Menlo Park, California, USA	cottrell@slac.stanford.edu
D'Ujanga Mutonyi, Florence; Makerere University, Kampala, Uganda	<a href="mailto:fdujanga@physics.mak.ac.ug"><u>fdujanga@physics.mak.ac.ug</u></a>
Damtie, Baylie; Washera Geospace and Radar Science Laboratory, Bahir Dar University, Gojjam, Ethiopia	bayliedamtie@yahoo.com
Davila, Joseph; NASA Goddard Space Flight Center, Greenbelt, Maryland, USA	Joseph.M.Davila@nasa.gov
Doherty, Patricia; Institute for Scientific Research (ISR), Boston College, Chestnut Hill, Massachusetts, USA	<a href="mailto:patricia.doherty@bc.edu"><u>patricia.doherty@bc.edu</u></a>
Doumouya, Vafi; Laboratoire de Physique de l'Atmosphère, Unite de Formation et de Recherche-Sciences des Structures de la Matiere et de Technologie (UFR SSMT), Université de Cocody à Abidjan, Côte d'Ivoire	doumouya@ucar.edu

Fernandes, Rui da Silva; University of Beira Interior, Center of Geophysics of University of Lisbon, Institute D. Luis, Covilhã, Portugal	rmanuel@di.ubi.pt
Ferreira, Stefan; Unit for Space Physics, North-West University, Potchefstroom, South Africa	stefan.ferreira@nwu.ac.za
Fichtner, Horst; Institut für Theoretische Physik IV, Ruhr University, Bochum, Germany	hf@tp4.rub.de
Fuller-Rowell, Tim; NOAA Space Weather Prediction Center, and University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES), Boulder, Colorado, USA	Tim.Fuller-Rowell@noaa.gov
Gopalswamy, Natchimuthukonar; NASA Goddard Space Flight Center, Greenbelt, Maryland, USA	nat.gopalswamy@nasa.gov
Groves, Keith; Space Weather Center of Excellence, Air Force Research Laboratory (AFRL), Space Vehicles Directorate, Hanscom Air Force Base, Massachusetts, USA	keith.groves@hanscom.af.mil
Habanyama, Adrian; University of Zambia, Lusaka, Zambia	ahabanyama@yahoo.com
Habarulema, John Bosco; Rhodes University, Grahamstown and Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:jhabarulema@hmo.ac.za">jhabarulema@hmo.ac.za</a>
Hady, Ahmed Abdel; Cairo University, Cairo, Egypt	<a href="mailto:aahady@yahoo.com">aahady@yahoo.com</a>
Hambulo, Jeff Lubinga; University of Zambia, Lusaka, Zambia	
Hartinger, Michael; Institute for Geophysics and Planetary Physics, University of California at Los Angeles (UCLA), California, USA	<a href="mailto:mhartinger@ucla.edu">mhartinger@ucla.edu</a>
Heruska, Benjamin; Space Weather Center of Excellence, Air Force Research Laboratory (AFRL), Space Vehicles Directorate, Hanscom Air Force Base, Massachusetts, USA	benjamin.heruska@hanscom.af.mil
Kabongo, Leba Guy; Laboratoire de Géophysique, FSTGAT, Democratic Republic of Congo	<a href="mailto:geekale@gmail.com">geekale@gmail.com</a>
Kabumbwe, Hansingo; University of Zambia, Zambia	

Kahindo Murumba, Bruno; Laboratoire de Physique de l'Environnement, Université de Kinshasa, Côte d'Ivoire	<a href="mailto:bkahindo@gmail.com">bkahindo@gmail.com</a>
Kalebwe, Peter; University of Zambia, Lusaka, Zambia	<a href="mailto:pckalebwe2000@yahoo.com">pckalebwe2000@yahoo.com</a>
Karoro, Angela; Makerere University, Kampala, Uganda	<a href="mailto:kangela@physics.mak.ac.ug">kangela@physics.mak.ac.ug</a>
Kawesha, Mwansa; University of Zambia, Lusaka, Zambia	<a href="mailto:mkawesha@hotmail.com">mkawesha@hotmail.com</a>
Kebede, Abebe; North Carolina A&T State University, Greensboro, North Carolina, USA	<a href="mailto:abkebede@gmail.com">abkebede@gmail.com</a>
Kouba, Daniel; Institute of Atmospheric Physics, ASCR, Praha, Czech Republic	<a href="mailto:kouba@ufa.cas.cz">kouba@ufa.cas.cz</a>
Lawal, Hammed Adeniyi; Olabisi Onabanjo University, Ago-Iwoye, Nigeria	<a href="mailto:hadelawal@yahoo.co.uk">hadelawal@yahoo.co.uk</a>
Lefevre, Francois; Union Radio-Scientifique Internationale (URSI), France	<a href="mailto:lefeuvre@cnrs-orleans.fr">lefeuvre@cnrs-orleans.fr</a>
Lotz, Stefan; Rhodes University, Grahamstown, and Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:slotz@hmo.ac.za">slotz@hmo.ac.za</a>
Mabie, Justin; University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES) and NOAA National Geophysical Data Center	<a href="mailto:Justin.Mabie@noaa.gov">Justin.Mabie@noaa.gov</a>
Macamo, Alberto Julião; Eduardo Mondlane University, Maputo, Mozambique	<a href="mailto:macamo.alberto@uem.mz">macamo.alberto@uem.mz</a>
Madougou, Saïdou; University Abdou Moumouni, Niamey, Niger	<a href="mailto:nassara01@yahoo.fr">nassara01@yahoo.fr</a>
Magidimisha, Edwin; Unit for Space Physics, North-West University, Potchefstroom, South Africa	<a href="mailto:20884664@nwu.ac.za">20884664@nwu.ac.za</a>
Mahrous, Ayman; Space Weather Center, Helwan University, Cairo, Egypt	<a href="mailto:amahrous@helwan.edu.eg">amahrous@helwan.edu.eg</a>
Makela, Jonathan; University of Illinois at Urbana-Champaign, Illinois, USA	<a href="mailto:jmakela@illinois.edu">jmakela@illinois.edu</a>

Manda, Nawa K.; University of Zambia, Lusaka, Zambia	<a href="mailto:naw_am4u@yahoo.com">naw_am4u@yahoo.com</a>
Manuel, Rex; Unit for Space Physics, North-West University, Potchefstroom, South Africa	<a href="mailto:21245274@nwu.ac.za">21245274@nwu.ac.za</a>
Maphaha, Kenneth; University of KwaZulu-Natal, Durban, South Africa	<a href="mailto:kmaphaha@hmo.ac.za">kmaphaha@hmo.ac.za</a>
McKinnell, John; Rhodes University, Grahamstown, South Africa	<a href="mailto:J.McKinnell@ru.ac.za">J.McKinnell@ru.ac.za</a>
McKinnell, Lee-Anne; Rhodes University, Grahamstown, and Hermanus Magnetic Observatory, Hermanus, South Africa	L.McKinnell@ru.ac.za
Mene, Medard Niangoran; Université de Cocody à Abidjan, Côte d'Ivoire	<a href="mailto:medardmene@yahoo.fr">medardmene@yahoo.fr</a>
Mengistu Tsidu, Gizaw; Addis Ababa University, Addis Ababa, Ethiopia	<a href="mailto:gizaw@phys.aau.edu.et">gizaw@phys.aau.edu.et</a>
Mengistu, Isseyas; Space Weather Center of Excellence, Air Force Research Laboratory (AFRL), Space Vehicles Directorate, Hanscom Air Force Base, Massachusetts, USA	<a href="mailto:isseyas.mengistu@hanscom.af.mil">isseyas.mengistu@hanscom.af.mil</a>
Moeketsi, Daniel M.; Centre for High Performance Computing, CSIR, Meraka Institute, Rosebank, Cape Town, South Africa	<a href="mailto:dmoeketsi@csir.co.za">dmoeketsi@csir.co.za</a>
Moldwin, Mark; University of California at Los Angeles (UCLA), Earth and Space Sciences, California, and University of Michigan, Atmospheric, Oceanic, and Space Sciences, Michigan, USA	<a href="mailto:mmoldwin@ucla.edu">mmoldwin@ucla.edu</a>
Mthembu, Sibusiso; University of KwaZulu-Natal, Durban, South Africa and Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:smthembu@hmo.ac.za">smthembu@hmo.ac.za</a>
Mudzingwa, Courage; Rhodes University, Grahamstown, South Africa and Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:mudzingwac@gmail.com">mudzingwac@gmail.com</a>
Munyeme, Geoffrey; University of Zambia, Lusaka, Zambia	<a href="mailto:gmunyeme@yahoo.co.uk">gmunyeme@yahoo.co.uk</a>
Murabana Oduori, Susan; Hands-on Universe Africa, Nairobi, Kenya	<a href="mailto:smurabana@gmail.com">smurabana@gmail.com</a>

Mwakifwamba, Isaac; University of Zambia, Lusaka, Zambia	<a href="mailto:isahmwakifwamba@yahoo.co.uk"><u>isahmwakifwamba@yahoo.co.uk</u></a> <a href="mailto:mkmwali@yahoo.co.uk"><u>mkmwali@yahoo.co.uk</u></a>
Mwali, Nthaziyake; Surveys Department, Malawi	
Mwansa, Cynthia; University of Zambia, Lusaka, Zambia	<a href="mailto:mwansa1ck@yahoo.co.uk"><u>mwansa1ck@yahoo.co.uk</u></a>
Mweene, Habatwa Vincent; Department of Physics, School of Natural Sciences, University of Zambia, Lusaka, Zambia	<a href="mailto:habatwamweene@yahoo.com"><u>habatwamweene@yahoo.com</u></a>
Mwewa, Melody; University of Zambia, Lusaka, Zambia	bubumelo4lf89@yahoo.co.uk
Mwiinga, Nchimunya; University of Zambia, Lusaka, Zambia	<a href="mailto:nchimy@gmail.com"><u>nchimy@gmail.com</u></a> <a href="mailto:muzunzumtt@malawi.net"><u>muzunzumtt@malawi.net</u></a>
Mzunzu, Micheal; Surveys Department, Malawi	
Namumba, Brenda; University of Zambia, Lusaka, Zambia	<a href="mailto:beenamz@yahoo.com"><u>beenamz@yahoo.com</u></a>
Ndeda, Jared D. H.; Jomo Kenyatta University, Nairobi, Kenya	<a href="mailto:jndeda6060@yahoo.com"><u>jndeda6060@yahoo.com</u></a>
Ngobeni, Donald; Vaal University of Technology, Vanderbijlpark, South Africa	donaldng@vut.ac.za
Ngweshe, Joseph R.; University of Zambia, Lusaka, Zambia	<a href="mailto:rematid@yahoo.com"><u>rematid@yahoo.com</u></a>
Ngwira, Chigomezyo; Rhodes University, Grahamstown, South Africa, and Hermanus Magnetic Observatory, Hermanus, South Africa	cngwira@hmo.ac.za
Nigussie Melessew, Gereme; Bahir Dar University, Ethiopia	<a href="mailto:melenigu@yahoo.com"><u>melenigu@yahoo.com</u></a>
Nkosi, Sibusiso Godfrey; Unit for Space Physics, North-West University, Potchefstroom, South Africa	sibusiso@vut.ac.za
Obrou, Olivier; Laboratoire de Physique de l'Atmosphère, Université de Cocody à Abidjan, Côte-d'Ivoire	<a href="mailto:obrou.olivier@univ-cocody.ci"><u>obrou.olivier@univ-cocody.ci</u></a>
Okere, Bonaventure; Centre for Basic Space Science, University of Nigeria	<a href="mailto:ibokere2001@yahoo.com"><u>ibokere2001@yahoo.com</u></a>
Okoh, Daniel; Rhodes University, Grahamstown, and Hermanus Magnetic Observatory, Hermanus, South Africa	dokoh@hmo.ac.za

O'Loughlin, Karen Fay; NOAA Space Weather Prediction Center, and University of Colorado, Cooperative Institute for Research in Environmental Sciences (CIRES), Boulder, Colorado, USA	Karen.O'Loughlin@noaa.gov
Ouattara, Frédéric; École Nationale Supérieure de l'Université of Koudougou, Koudougou, Burkina Faso	fojals@yahoo.fr
Oyeyemi, Elijah; University of Lagos, Lagos, Nigeria	<a href="mailto:e_oyeyemi@yahoo.co.uk">e_oyeyemi@yahoo.co.uk</a>
Parete-Koon, Suzanne; United States Department of State, Washington, DC, USA	Parete-KoonST@state.gov
Phiri, Temwani; University of Zambia, Lusaka, Zambia	temwanyjoshua@yahoo.co.uk
Potgieter, Marius; Unit for Space Physics, North-West University, Potchefstroom, South Africa	marius.potgieter@nwu.ac.za
Rabiu, Babatunde; Centre for Space Research and Applications, Federal University of Technology, Akure, Nigeria	<a href="mailto:tunderabiu@yahoo.com">tunderabiu@yahoo.com</a>
Radicella, Sandro M.; Aeronomy and Radio Propagation Laboratory, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy	rsandro@ictp.it
Reiff, Patricia; Rice Space Institute, Houston, Texas, USA	<a href="mailto:reiff@rice.edu">reiff@rice.edu</a>
Richardson, John; Kavli Center for Astrophysics and Space Science, Massachusetts Institute of Technology (MIT), Massachusetts, USA	<a href="mailto:jdr@space.mit.edu">jdr@space.mit.edu</a>
Scherer, Klaus; Institut für Theoretische Physik IV, Ruhr University, Bochum, Germany	<a href="mailto:kls@tp4.rub.de">kls@tp4.rub.de</a>
Scherliess, Ludger; Utah State University, Logan, Utah, USA	ludger.scherliess@usu.edu
Scherrer, Deborah; Stanford University, HEPL Solar Physics, Stanford, California, USA	<a href="mailto:dscherrer@solar.stanford.edu">dscherrer@solar.stanford.edu</a>
Sibanda, Patrick; Rhodes University, Grahamstown, and Hermanus Magnetic Observatory, Hermanus, South Africa	psibanda@hmo.ac.za
Sieberhagen, Petro Maria; North-West University, Potchefstroom, South Africa	petro.sieberhagen@nwu.ac.za

Simpemba, Prosperity; United Nations Programme on Space Applications, Space Generation Advisory Council (SGAC),	<a href="mailto:pcsimpemba@yahoo.com">pcsimpemba@yahoo.com</a>
Smith, Roger W.; Geophysical Institute, Fairbanks, Alaska, USA	<a href="mailto:roger.smith@gi.alaska.edu">roger.smith@gi.alaska.edu</a>
Soneka, Womba; University of Zambia, Lusaka, Zambia	<a href="http://www.wombasonek@yahoo.com">www.wombasonek@yahoo.com</a>
Strauss, Du Toit; Unit for Space Physics, North-West University, Potchefstroom, South Africa and Centre for High Performance Computing (CHPC), CSIR, Meraka Institute, Rosebank, Cape Town, South Africa	<a href="mailto:dutoit.strauss@nwu.ac.za">dutoit.strauss@nwu.ac.za</a>
Su, Yi-Jiun; Space Weather Center of Excellence, Air Force Research Laboratory, Space Vehicles Directorate, Hanscom Air Force Base, Massachusetts, USA	<a href="mailto:Yi-Jiun.Su@hanscom.af.mil">Yi-Jiun.Su@hanscom.af.mil</a>
Sumners, Carolyn; Houston Museum of Natural Science, Houston, Texas, USA	<a href="mailto:csumners@hmns.org">csumners@hmns.org</a>
Sutcliffe, Peter; Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:psutcliffe@hmo.ac.za">psutcliffe@hmo.ac.za</a>
Tshisaphungo, Mpho; Rhodes University Grahamstown, and Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:mtshisaphungo@hmo.ac.za">mtshisaphungo@hmo.ac.za</a>
Uwamahoro, Jean; Rhodes University, Grahamstown, South Africa, and Hermanus Magnetic Observatory, Hermanus, South Africa	<a href="mailto:juwamahoro@hmo.ac.za">juwamahoro@hmo.ac.za</a>
Vos, Etienne; Unit for Space Physics, North-West University, Potchefstroom, South Africa	<a href="mailto:20068034@nwu.ac.za">20068034@nwu.ac.za</a>
Yamazaki, Yosuke; Earth and Planetary Sciences, Space and Earth Electromagnetism Laboratory, Kyushu University, Fukuoka, Japan	<a href="mailto:zaki@geo.kyushu-u.ac.jp">zaki@geo.kyushu-u.ac.jp</a>
Yizengaw, Endawoke; Institute of Geophysics and Planetary Physics, University of California at Los Angeles (UCLA), California, USA	<a href="mailto:ekassie@igpp.ucla.edu">ekassie@igpp.ucla.edu</a>
Zaka, Komenan; Université de Cocody à Abidjan, Côte d'Ivoire	<a href="mailto:komzach@yahoo.fr">komzach@yahoo.fr</a>
Zaourar, Naima Boulasbaa; Laboratoire de Géophysique, FSTGAT, Alger, Algérie	<a href="mailto:naimazaourar@yahoo.fr">naimazaourar@yahoo.fr</a>

## APPENDIX D

### IHY-Africa/SCINDA 2009 PROGRAM

*SUNDAY Morning (June 7, 2009)*

08:00-09:00 **Registration**

All IHY-Africa/SCINDA 2009  
Workshop participants

### **SCINDA 2009 (Scintillation Network Decision Aid) Workshop**

#### **SCINDA Workshop**

*Chair: Keith Groves*

09:00-10:30 Keith Groves

Welcome & Introductions

SCINDA Update—status, new sites

10:30-11:00 **Tea Break**

11:00-11:30 Charlie Carrano

Remote sensing the ionosphere  
using GPS-SCINDA

11:30-12:00 Isseyas Mengistu &  
Benjamin Heruska

Interactive Tutorial: Installation and  
operation of a GPS-SCINDA system

12:00-12:30 Instrumentation  
Discussion

12:30-13:45 **Lunch Break**

*SUNDAY Afternoon*

#### **SCINDA-2009 Workshop (continued)**

*Chair: Ron Caton*

---

13:45-14:45	Ron Caton & Justin Mabie	An overview of SCINDA-based products and the SCINDA-IHY website
14:45-15:05	Babatunde Rabiu	Variation of TEC and Ionospheric Scintillation over a Terrestrial Point in Nigeria
15:05-15:25	Paul Baki	Installation of SCINDA-GPS receiver and pre-luminary results from the Nairobi station
15:25-15:45	Larry Amaeshi	Near real-time ionospheric total electron content and scintillation index measurements at the equatorial station of Akoka, Lagos, by means of GPS satellites' signals
15:45-16:15	<b>Tea Break</b>	
16:15-16:35	Jacob Adeniyi	Preliminary TEC data over Ilorin an equatorial station
16:35-16:55	Bonaventure Okere	Atmospheric delay and delay corrections at Nsukka, Nigeria
16:55-17:15	Discussion	

***MONDAY Morning (June 8, 2009)***

**SCINDA-2009 Workshop (*continued*)**

*Chair: Gizaw Mengistu Tsidu*

09:00-09:10	Keith Groves	Vision for SCINDA Collaboration
09:10-10:10	Collaboration Discussion	
10:10-10:30	Yihenew Dagne / Baylie Damtie	MATLAB-based software for analyzing and visualizing raw data from SCINDA GPS receiving systems
10:30-11:00	<b>Tea Break</b>	

11:00-11:20	Rui Fernandes	Optimizing the use of GPS CORS installations in Africa
11:20-11:35	Abebe Kebede	Analysis of TIDs using SCINDA GPS TEC data
11:35-11:50	Pierre Cilliers	Ionospheric scintillation monitoring in the Antarctic and South Atlantic using signals from GPS satellites: Update
11:50-12:30	Keith Groves	SCINDA Status & Future Plans
12:30-13:45	<b>Lunch Break</b>	

***MONDAY Afternoon***

**The International Heliophysical Year (IHY) Africa Workshop**

***Official Opening Ceremony***

*Chair: Roger Smith*

13:45-13:55	Roger Smith	Introductions
13:55-14:05	Joseph Davila	Welcome from The International Heliophysical Year Secretariat
14:05-14:55	Sponsors & Representative Organizations	
15:55-15:00	Dean of University of Zambia, Dr. Samuel Banda	Welcome from the Dean
15:00-15:05	Vice Chancellor of the University of Zambia, Prof. Stephen Simukanga	Welcome from the Vice Chancellor
15:05-15:15	The Honourable Minister of Science & Technology, Zambia, Honourable Gabriel Namulambe	Opening Address

15:15-15:30 Assemble at buses for transport to Zambezi River

15:30-20:00 **Welcoming Reception & Sunset River Cruise**

**TUESDAY Morning (June 9, 2009)**

### **The International Heliophysical Year (IHY) Overview**

*Chair: Patricia Doherty*

08:30-08:50	Joseph Davila	International Space Weather Initiative
08:50-09:10	Roger Smith	Heliophysical Processes
09:10-09:30	Gizaw Mengistu Tsidu	Report on IHY-Africa 2007 Workshop, Addis Ababa, Ethiopia

### **Science Session: Magnetosphere-Ionosphere Coupling and Electrodynamics**

*Chair: Endawoke Yizengaw*

09:30-10:15	Mark Moldwin	Inner Magnetosphere-Ionosphere Coupling Tutorial
10:15-10:35	Anthea Coster	Magnetospheric-Ionospheric Coupling: A ground-based experimental perspective
10:35-11:05	<b>Tea Break</b>	
11:05-11:25	Yosuke Yamazaki	MAGDAS Project at SERC for Space Weather during IHY/ISWI
11:25-11:45	Peter Sutcliffe	Pi2 pulsations: Ionosphere/ground signatures of dynamic processes in the magnetotail
11:45-12:05	Charlie Carrano	Separating the Ionospheric and Plasmaspheric Contributions to GPS Measurements of Total Electron Content

12:05-12:25 Vafi Doumouya Seasonal effects in the equatorial electrojet longitudinal variations

12:25-12:30 Discussion

12:30-13:45 **Lunch Break**

**TUESDAY Afternoon**

**Science Session: Magnetosphere-Ionosphere Coupling and Electrodynamics (continued)**

*Chair: Vafi Doumouya*

13:45-14:05 Keith Groves The equatorial ionosphere during solar minimum—C/NOFS observations of deep plasma depletions at sunrise and wide decreases in density in the Atlantic anomaly region

14:05-14:25 Endawoke Yizengaw AMBER magnetometer array and the equatorial electrodynamics

14:25-14:45 Tim Fuller-Rowell Impact of the lower atmosphere on low latitude electrodynamics

14:45-15:05 Yi-Jiun Su Assimilative Modeling of Equatorial Plasma Depletions Observed by C/NOFS

15:05-15:45 Discussion

15:45-16:15 **Tea Break**

**Open Forum I: Infrastructure & Communications in Africa**

*Chairs: Victor Chukwuma & Daniel Moeketsi*

16:15-16:30 Daniel Moeketsi Centre for High Performance Computing in South Africa: Opportunities for African research collaboration

16:30-16:45	Les Cottrell	African internet performance: How bad is it; what can be done?
16:45-17:00	Victor Chukwuma	Digital Divide, eGY-Africa, and the way forward
17:00-17:15	African Infrastructure Open Discussion	

**TUESDAY Evening**

17:30-19:00	<b>Poster Session I</b>  <b>Magnetosphere-Ionosphere Coupling and Electrodynamics</b> <b>Sun-Heliosphere Connection</b> <b>Open Forums II &amp; IV</b> <b>General Posters I</b> <i>Convener: Pierre Cilliers</i> <i>Chairs: Jean Uwamahoro &amp; Mpho Tshisaphungo</i>
-------------	---

**WEDNESDAY Morning (June 10, 2009)**

**Science Session: Sun-Heliosphere Connection**

*Convener: Marius Potgieter*

08:30-09:05	Nat Gopalswamy	Solar Activity – A Tutorial
09:05-09:10	Discussion	
09:10-09:45	John Richardson	The Solar Wind Magnetic Field
09:45-09:50	Discussion	
09:50-10:25	Stefan Ferreira	Cosmic ray transport and acceleration in a realistic heliosphere
10:25-10:30	Discussion	
10:30-11:00	<b>Tea Break</b>	

*Chair: Stefan Ferreira*

11:00-11:30	Horst Fichtner	Acceleration of charged particles in the heliosphere
11:30-11:35	Discussion	
11:35-12:05	Marius Potgieter	Cosmic rays as probes of the dynamic heliosphere
12:05-12:10	Discussion	
12:10-12:30	Du Toit Strauss	The modeling of anomalous cosmic ray oxygen
12:30-13:45	<b>Lunch Break</b>	

***WEDNESDAY Afternoon***

13:45-16:00 **Excursion to Victoria Falls**

***WEDNESDAY Evening***

17:40 Buses leave for David Livingstone Lodge

18:00-21:00 **Workshop Dinner at David Livingstone Safari Lodge**

***THURSDAY Morning (June 11, 2009)***

**Science Session: Ionospheric Irregularities and Scintillations**

*Chair: Lee-Anne McKinnell*

08:30-09:15 Keith Groves Tutorial Ionospheric Scintillation: Models, Measurements, and Impacts

09:15-09:35	Elijah Oyeyemi	On the empirical model for $F_2$ peak height of the ionosphere
09:35-09:55	Chigomezyo Ngwira	A comparative study of ionospheric irregularities over Southern Africa
09:55-10:15	Pierre Cilliers	Comparison of ionospheric scintillation indices from co-located GPS and GISTM receivers in the Antarctic and South Atlantic
10:15-10:30	Discussion	
10:30-11:00	<b>Tea Break</b>	

### Science Session: Sun-Heliosphere Connection (*continued*)

*Chair: Horst Fichtner*

11:00-11:20	Etienne Vos	On the charge-sign dependence of cosmic rays in the heliosphere: A journey from Voyager 1 & 2 to Ulysses and PAMELA
11:20-11:40	Donald Ngobeni	Implications of a latitude dependent solar wind speed on cosmic rays in the heliosheath
11:40-12:00	Rex Manuel	Time dependent cosmic ray modulation in the heliosphere
12:00-12:20	Klaus Scherer	Heliophysics, Space Climate, and the Earth
12:20-12:30	Discussion	
12:30-13:45	<b>Lunch Break</b>	

### THURSDAY Afternoon

### Science Session: Ionospheric Irregularities and Scintillations

*(continued) Chair: Keith Groves*

13:45-14:05	Jonathan Makela	Signatures of ionospheric irregularities in optical and radio observations
-------------	-----------------	--

14:05-14:25	Dieter Bilitza	Representation of Irregularities in the International Reference Ionosphere
14:25-14:45	Yannick Béniguel	Ionosphere equatorial scintillations recorded during the PRIS scintillation measurement campaign
14:45-15:05	Ron Caton	Observations of ionospheric irregularity development with ALTAIR
15:05-15:25	Dalia Burešová	Manifestation of strong geomagnetic storms in the ionosphere: Observations and modeling
15:25-15:45	Christine Amory-Mazaudier	Sun Earth's Studies / Ionosphere: Results obtained by the International Research Group in Geophysics Europe Africa Asia from 2002 to 2008

15:45-16:15 **Tea Break**

**Open Forum II: Science Education & Outreach**

*Chairs: Carolyn Sumners & Patricia Reiff*

16:15-16:30	Patricia Doherty & Sandro Radicella	An International Partnership for Sustainable Development in Navigation Science and Technology in Africa
16:30-16:45	Susan Murabana Oduori	Hands-on Universe Africa
16:45-17:15	Education & Outreach Discussion	

**THURSDAY Evening**

17:30-19:00

**Poster Session II**

**Ionospheric Irregularities and Scintillations and SCINDA**

**Total Electron Content**

**Open Forums I & III**

**General Posters II**

*Convener: Pierre Cilliers*

*Chairs: Courage Mudzingwa and Daniel Okoh*

**FRIDAY Morning (June 12, 2009)**

**Science Session: Total Electron Content**

*Chair: Tim Fuller-Rowell*

08:30-09:15	Ludger Scherliess– Tutorial	The morphology, dynamics, and variability of low- and mid-latitude total electron content
09:15-09:35	John Bosco Habarulema	Progress towards predictions of TEC derived from GPS over Southern Africa
09:35-09:55	Niangoran Mene	Progress towards predictions of TEC derived from GPS over Southern Africa
09:55-10:15	Anthea Coster	Monitoring the Global TEC with ground and space-based GPS
10:15-10:25	Discussion	
10:25-10:55	<b>Tea Break</b>	
10:55-11:15	Frédéric Ouattara	West Africa ionosphere case studies by using GPS receivers involved in IHY project: First results

11:15-11:35	Ayman Mahrous	First results of CIDR measurements over Egypt
11:35-11:55	Olivier Obrou	First results of TEC variation from SCINDA GPS receiver in Abidjan
11:55-12:15	Lee-Anne McKinnell	GPS TEC and Ionosonde TEC over Grahamstown, South Africa: First Comparisons
12:15-12:30	Discussion	
12:30-13:45	<b>Lunch Break</b>	

***FRIDAY Afternoon***

**Science Session: Total Electron Content (*continued*)**

*Chair: Christine Amory-Mazaudier*

13:45-14:05	Sandro Radicella	TEC Modeling
14:05-14:25	Patricia Doherty	The Low-latitude Ionospheric Sensor Network: The Initial Campaigns and Implications for an African Network
14:25-14:45	Discussion	

**Open Forum III: Instruments & Data Bases**

*Chair: Christine Amory-Mazaudier & Justin Mabie*

14:45-15:05	Christine Amory-Mazaudier	Instrument Summaries
15:05-15:15	Andrew Collier	Monitoring the Lower Ionosphere using AWESOME and UltraMSK
15:15-15:45	Justin Mabie	GPS Database for Africa
15:45-16:15	<b>Tea Break</b>	

**Open Forum IV: Establishment of African Geophysical Society  
(AGS)**

*Chairs: Babatunde Rabiu & Baylie Damtie*

16:15-16:35	Babatunde Rabiu	Introducing the African Geospace Society
16:35-17:15	Panel Discussion	

17:15-18:00 **Wrap-up Discussion & Official Closing**

*Chair: Endawoke Yizengaw*

## APPENDIX E

# Related Workshop GIFT Workshop

**NASA Geophysical Information for Teachers**  
**“Sun-Earth Relationships and the International Heliophysical Year”**  
**June 6, 2009, Livingstone, Zambia**

Deborah Scherrer, Stanford University, California, USA  
Mark Moldwin, University of California at Los Angeles, USA  
Endawoke Yizengaw, University of California at Los Angeles, USA  
Patricia Reiff, Rice Space Institute, Houston, Texas, USA  
Carolyn Sumners, Houston Museum of Natural Science, Texas, USA  
Cristina Rabello-Soares, Stanford University, California, USA

### Local Organizing Committee

Vincent Mweene; University of Zambia, Lusaka, Zambia  
Vimbi V. Mateke, Linda High School, Livingstone, Zambia  
Nchimunya Mwiinga, University of Zambia, Lusaka, Zambia  
Leonard Nkhata, Hillcrest High School, Livingstone, Zambia

Schedule	Activity	Facilitator
07:15 to 07:50	Arrival and registration of participants	Mwiinga/Yizengaw
07:50	Arrival of PEO and SESO	Mateke
08:00 to 08:15	Introductions	Yizengaw and Mateke
08:15 to 08:20	Speech by SESO	Mateke
08:20 to 08:30	Speech by PEO and Opening Ceremony	Mateke
08:30 to 08:35	Vote of thanks	Scherrer
08:35	Departure of PEO	Mateke & SESO
08:35 to 09:35	Earth – Sun relationships Overview, Q & A	Moldwin / Yizengaw
09:35 to 10:20	Space Weather Observing - Spectroscopy	Scherrer
<b>10:20 to 10:40</b>	<b>Break</b>	<b>Timekeeper</b>
10:40 to 12:20	Spectroscopy II and SolarScapes	Moldwin / Scherrer
<b>12:20 to 13:20</b>	<b>LUNCH</b>	<b>Timekeeper</b>
13:20 to 14:50	Space weather magnetism activities	Moldwin
14:50 to 15:20	Break and Solar Viewing & UV beads	Moldwin /Scherrer
15:20 to 16:50	Planetarium Show & Activities	Reiff/Sumners
16:50 to 17:10	Discussion and Evaluation	All
17:10 to 17:20	Presentation of Certificates of Attendance	SESO/ Yizengaw /Scherrer
17:20 to 17: 25	Vote of thanks	Hamanyati
17:25 to 17:30	Closing remarks	Yizengaw, SESO and Mateke
<b>17:30</b>	<b>End of the GIFT workshop</b>	<b>All</b>

## APPENDIX F

### Open Forum III: Instruments & Data Bases

*Chair: Christine Amory-Mazaudier & Justin Mabie*

During IHY different arrays of scientific instruments were deployed or were operating over Africa: SCINDA, CIDR, AWESOME, SID, RENOIR, AMBER, CALLISTO, MAGDAS, and AGREES /GPS (still pending)

Different arrays were operating before the IHY: INTERMAGNET, AMMA, IGS etc...

During the forum, there was a round table and all the providers of data agreed to share the data. Some data of existing arrays are already on the web.

Here is the summary concerning the GPS and magnetometers network

#### Four arrays of magnetometers

MAGDAS -> deployed / ~ 12 magnetometers -> contact Dr Yumoto

AMBER -> deployed / 4 magnetometers -> contact Dr Kassie

INTERMAGNET -> permanent network/ 9 magnetometers -> free on the web

IPGP -> permanent network 3 magnetometers -> free on the web

#### Four arrays of GPS

SCINDA -> deployed / ~ 8 GPS -> contact Dr K. Groves

AMMA -> existing for a project on monsoon / ~6 GPS -> contact Dr O. Bock

IGS -> permanent network /~20 GPS -> free on the web

AGREES -> still pending network

Concerning the GPS data it is very important to develop the GPS data base for Africa in the frame of the SPIDR data base as it is easier to have all the data together in the same format (RINEX°) than to contact each provider separately.

## APPENDIX G

### **Open Forum I: Infrastructure & Communications in Africa**

*Chairs: Victor Chukwuma & Daniel Moeketsi*

- 1) The forum was chaired by Victor U. CHUKWUMA (Nigeria) and Daniel MOEKETSI (South Africa)
- 2) Three papers were presented by
  - a) Daniel Moeketsi- “Centre for High Performance Computing in South African Research Collaborations”
  - b) Les Cottrell – “African Internet Performance: How bad is it; what can be done”
  - c) Victor Chukwuma - “Digital Divide, eGY-Africa, and the way forward”
- 3) African Infrastructure Open Discussion Segment of the forum generated series of suggestions on the way forward, the resolutions and suggestions are as follows:
  - a) Transformation of eGY to an NGO as special purpose vehicle strongly supported
  - b) Collaboration with existing Networks provider in each countries towards bridging the gap
  - c) Vafi Doumonya (Ivory Coast) emphasized the importance of highlighting each countries individual problems, finding possible way forward taking into cognizance that internet policy varies from country to country
  - d) Francois Lefevre (URSI, PRESIDENT, FRANCE) emphasized the importance of contacting the URSI regional offices and making use of his office towards the regional office(s) on their involvement towards solving the communication problem confronting African Scientist
  - e) Sandro Radicella (ICTP) highlighted
    - 1) Capacity building for the use and management of the systems
    - 2) Power Supply
    - 3) Possible involvements of ICTP in capacity building
  - f) Christine Amory-Mazaudier (FRANCE) emphasized

- 1) Replicating what was done in Latin America which Boubakar has adequate information, and as such should be involved.
  - 2) She emphasized working with ICT community in individual country on required applications comparing it to what has been done in South Africa
- g) Sandro Radicella retreated the importance of making representation at the forthcoming General Assembly of African Union on ICT problem in Africa through the United Nation resources of Science and Technical of African Union(AU) Commission
  - h) Appointments and involvements of Ambassadors in each country towards bridging the digital divide was emphasized
  - i) Justin Mabie (NOAA-USA) highlighted the importance of improving diplomatic ties with advanced countries making reference to USA whose representative is a participant at the on-going workshop
  - j) James Chibueze (Nigeria-JAPAN) emphasized Private Sector Participation
  - k) Lekove (Liberia) mentioned the importance of contacting decision makers in each country

The open discussion segment was concluded with an agreement to send the resolutions to individual for review and contributions.